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EXAMINER	
KINNEY, ANNA L	

ART UNIT	PAPER NUMBER
1731	

DATE MAILED: 12/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/681,233	**Applicant(s)** STIGSSON, LARS LENNART	
	Examiner Anna Kinney	**Art Unit** 1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/29/05*.
2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-14* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed September 29, 2005 have been fully considered but they are not persuasive.

In response to applicant's arguments that Stigsson does not disclose partial oxidation of cellulose spent liquor (Remarks, p. 10), the Examiner disagrees. Stigsson clearly discloses partial oxidation in the Abstract, lines 4-6. Note that the claim language recites gasification, rather than partial oxidation.

In response to applicant's arguments that Stigsson does not disclose a very hot environment for formed smelt and particulates in the first reaction zone (Remarks, p. 11), the Examiner disagrees. Stigsson clearly discloses such a hot environment on p. 34, line 29 to p. 35, line 2.

In response to applicant's arguments that Stigsson does not teach the recycle of carryover to the gas generator feed (Remarks, p. 13), that limitation of claim 1 (e) is optional. Stigsson does teach the second option, dissolving entrained particles in an aqueous solution (p. 36, line 31 to p. 37, line 1). This response is also applied to the argument on p. 14 of the Remarks.

In response to applicant's arguments that Stigsson does not disclose cooling in the second reaction zone (Remarks, p. 13), the Examiner brings the applicant's attention to the excerpt from Stigsson underlined in the Remarks (last line of p. 12 to first line of p. 13). The Examiner does not consider reducing the temperature of the hot gas stream from 1000°C, which is within the claimed range of claim 1(a), to 999°C, which is within the claimed range of claim 1(c), to be a substantial reduction of temperature. Therefore, the Examiner considers Stigsson to read on this limitation.

In response to applicant's argument that Stigsson discloses only gravity separation in the first reaction zone (Remarks, p. 13), the Examiner disagrees. Stigsson, p. 36, l. 18-32, discloses separating molten alkaline material by gravity in a separate zone arranged in an up flow gas generator, with the hot gases generated in a first reaction zone and withdrawn in an upper section, and smelt discharged in a lower section. The Examiner considers this to clearly indicate that gravity separation occurs in a second zone, and molten alkaline materials fall through the first zone to the smelt discharge. This response is also applied to the argument on p. 14 of the Remarks.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., a solution preventing or reversing carbon dioxide reactions) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that none of the references teach cooling the gases to below about 250°C (Remarks, p. 14), the Examiner disagrees. As provided in the rejection, Nilsson discloses the temperature of the gases leaving the quench is on the order of 200°C (col. 3, lines 2-4), and further that the temperature of the combustion gases is permitted to fall from reactor temperature down to less than 300°C, preferably less than 250°C, and more preferably to approximately 200°C (col. 2, lines 28-32).

Instant claim 1, step (d) (ii) allows for the option of cooling the gas stream by direct quench.

Specification

The amendment filed September 29, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: (1) the correlation of sulfidity level in cooking liquor with the sulfur content of spent cooking liquor on p. 9, lines 27-29; and (2) the relationship between disodium borate and tetasodium borate. The Examiner notes that in the same paragraph, the specification discusses tetrasodium diborate ($Na_4B_2O_5$). In the Examiner's review of prior art, the Examiner found reference to tetrasodium borate ($Na_2B_4O_7 \cdot 10H_20$), which is synonymous with disodium tetraborate and sodium tetraborate. However, the Examiner found no indication that tetrasodium borate is synonymous with disodium borate.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4 and 5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In line 4 of both claims, the applicant has amended the limitations to include tetrasodium borate in the molten slag. Tetrasodium borate in the molten slag was not found in the description of the invention as it was originally filed. If the applicant feels that this rejection is in error, the Examiner invites the applicant to point out the support in the specification using page and line number.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1, 2, 3, 6, and 8 through 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson (WO 00/47812) in view of Backlund et al (U.S. Patent 5,746,886), and further in view of Kohl (U.S. Patent 4,682,985) and Nilsson (U.S. Patent 5,868,805).

With respect to claim 1, Stigsson discloses a two-stage process (page 33, line 34 to page 34, line 2) for the gasification of cellulose spent liquor, which process comprises the steps of: (a) combusting in a first reaction zone of a gas generator (page 36, line 27) a stream comprising an oxygen containing gas and a cellulose spent liquor (page 34, lines 29 to 30) at a pressure of from 0.1 to about 10 MPa (page 34, lines 31 to 32), evolving heat sufficient to raise the temperature in said reaction zone to a first temperature in the range of from 700 C to 1300 C (page 34, line 31), which includes one specific point within the claimed range of from 1000 degree C to 1400 degree C, forming a gaseous component stream and entrained slag particles and a liquid alkaline molten slag (page 34, lines 32 to 34), (b) separating said liquid alkaline molten slag from the gaseous component stream (page 36, lines 18 to 23) and dissolving liquid molten slag in an aqueous solution (page 36, line 34 to page 37, line 1), forming an alkaline liquor (page 37, lines 1 to 3), (c) cooling in a substantially vertically arranged second reaction or gas transfer zone of the gas generator said gaseous component stream and entrained slag particles to a second temperature (page 36, lines 27 to 29), (d) further cooling the gaseous component stream by at least one of; i) indirect heat exchange in one or more stages for the generation of fresh steam (page 36, lines 1 to 4), cooling by the direct injection of an aqueous quench liquid into the gaseous component stream (page 35, lines 31 to 34 and page 36, lines 8 to 10) (e) separating entrained slag particles from the gaseous component stream and dissolving said particles in an aqueous solution (page 36, lines 31 to page 37, line 1), (f) discharging the gaseous component stream from step e) for use as a gaseous fuel or for use as a synthesis gas (page 37, line 34 to page 38, line 2).

Stigsson does not disclose expressly that this procees is alkali catalysed, nor that the slag comprises at least 75% combined weight of alkali oxide, alkali hydroxide, alkali carbonate, and alkali borates, nor that the alkaline liquor of (b) has an alkali bicarbonate content lower than about 2 grams/liter, nor that the gas and entrained particles in the second reaction zone cool to a temperature below about 1000 C, nor that the gaseous component stream is further cooled to a temperature below about 250 C. However, in the absence of an express disclosure regarding the bicarbonate content, the Examiner assumes that the bicarbonate content is zero, which is within the range of lower than about 2 grams/liter.

Backlund et al discloses an alkali catalysed process (col. 4, lines 60 to 62 and col. 5, lines 9 to 10) for the gasification of cellulose spent liquor (col. 4, lines 32 to 35), which process comprises the steps of: (a) combusting a stream comprising an oxygen containing gas and a cellulose spent liquor (col. 4, lines 32 to 35) at a pressure of 25 bar, which corresponds to 2.5 MPa, which is a point within the claimed range of from 0.1 to about 10 MPa, evolving heat sufficient to raise the temperature in the reactor to a first temperature in the range of from 400 C to 1200 C, which includes one specific point within the claimed range of from 1000 degree C to 1400 degree C, forming a gaseous component stream and entrained alkali droplets and a liquid alkaline molten slag (col. 4, lines 38 to 42) comprising 79.3% alkali carbonate and alkali hydroxide (col. 6, lines 28 to 26, "sodium base" column), which contains one point which falls within the claimed range of at least 75 % combined weight of alkali oxide, alkali hydroxide, alkali carbonate and alkali borates, (b) separating said liquid alkaline molten slag from the gaseous component stream and dissolving liquid molten slag in an aqueous solution (col. 4, lines 44 to 46), forming an alkaline liquor (col. 5, lines 45 to 52).

Backlund et al does not disclose expressly that cooling in a second reaction or gas transfer zone of the gas generator is to a second temperature below about 1000 C, nor that further cooling the gaseous component stream is to a temperature below about 250 C.

Kohl discloses the combustion of cellulose spent liquor occurs in a first reaction zone (Figure 2, item 104) of a gas generator (Figure 2, item 100) (c) cooling in a substantially vertically arranged second reaction or gas transfer zone (Figure 2, item 102) of the gas generator said gaseous components stream and entrained slag particles to a second temperature between about 350 to 850 C, which is below the claimed temperature of about 1000 C (col. 11, lines 6 to 8).

Kohl does not disclose expressly that further cooling the gaseous component stream to a temperature below about 250 C.

Nilsson discloses further cooling the gaseous component stream to a temperature below about 250 C (col. 3, lines 2 to 3).

With respect to claim 2, Stigsson discloses cooling of the gaseous components stream and entrained slag particles in step c) is achieved by the injection of cellulose spent liquor which liquor under endothermic conditions is decomposed to a stream of gaseous components and entrained slag particles (page 36, lines 27 to 31).

With respect to claim 3, Stigsson discloses that liquid alkaline slag or slag particles are conveyed by gravity from the second reaction or gas transfer zone counter current to a gaseous component stream, to combine with the alkaline molten slag of step a) (page 36, lines 18 to 24).

With respect to claim 9, Stigsson discloses that the oxygen-containing gas is air, oxygen-enriched air, or oxygen (page 35, lines 4 to 8).

With respect to claim 10, Stigsson discloses that the cellulose spent liquor of step a) is recovered from an alkaline soda pulping process (page 15, lines 4 to 8) with an insignificant quantity of sulfur compounds (page 32, lines 14 to 15), which the Examiner interprets as equivalent to a pulping liquor sulfidity level lower than about 10 %.

With respect to claim 11, Stigsson discloses that the aqueous solution of e) is recycled as raw cooking liquor (page 36, line 34 to page 37, line 3). Although Stigsson does not disclose expressly that this solution is combined with the alkaline liquor of b), since both streams likely have the same point of reuse, it would have been obvious at the time of the invention to a person skilled in the art to combine the two streams prior to use.

With respect to claim 6, Stigsson does not disclose expressly discloses that the second temperature after cooling in step c) is in the range of 800 C to 1000 C.

Kohl discloses that the second temperature after cooling in step c) is in the range of 350 to 850 C (col. 11, lines 6 to 8), which contains one specific point within the claimed range of 800 C to 1000 C.

With respect to claim 8, Stigsson does not disclose expressly that the molten slag of step a) has a sulfide content corresponding to less than 2 % by weight of the smelt.

Kohl discloses that the molten slag of step a) has a sulfide content of 0.2% by weight, corresponding to the claimed less than 2 % by weight of the smelt (col. 16, line 67).

Stigsson, Backlund, Kohl, and Nilsson are analogous art because they are all from the same field of endeavor, that of recovering pulping chemicals by gasification.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply an alkali catalysed process of Backlund et al, with the cooling temperatures Kohl and Nilsson, to the gasification process of Stigsson, and to expect the slag composition of Backlund et al and Kohl from the modified process of Stigsson, to obtain the invention as specified in claims 1 through 3, 6, and 8 through 11.

The motivation for doing so would have been that (a) the catalytic effect makes it possible to operate a suspension bed gasifier at a lower temperature, while retaining the degree of carbon conversion (Backlund et al, col. 5, lines 21 to 26), and the composition is representative of a completely sodium-based system (Backlund et al, col. 5, lines 65 to 66); (b) cooling the gas below about 790 C is cool enough that particles of sodium salts are solid (Kohl, col. 11, lines 10 to 13), and the sulfur reduction efficiency has not been increased by using a divided air feed arrangement (Kohl, col. 17, lines 12 to 17); and (c) cooling the gas to the order of 200 C utilizes the thermal energy in the combustion gases after the gasification (Nilsson, col. 1, lines 13 to 14).

Claims 4-5 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund et al, Kohl, and Nilsson, as applied to claim 1, above, and further in view of Hupa et al ("Fireside behavior of black liquors containing boron", TAPPI Journal, Vol. 1, No. 1, March 2002, pages 48 to 52). The Examiner interpreted each of the claims to indicate one of a group or combination of elements.

With respect to claims 4 and 5, Hupa et al discloses alkali borates present in the molten slag of step a) comprise sodium metaborate, tetrasodium borate (p. 48, col. 1, lines 4-9), and trisodium borate (page 49, Table 1(B)).

With respect to claims 13 and 14, Hupa et al discloses alkali borates present in the molten slag of step a) substantially consist of trisodium borate (page 49, Table 1(B)).

Stigsson, Backlund, Kohl, Nilsson, and Hupa et al are analogous art because they are all from the same field of endeavor, that of recovering pulping chemicals.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to expect the slag composition as in Hupa et al to the chemical recovery process of Stigsson, to obtain the invention as specified in claims 4-5 and 13-14.

The motivation for doing so would have been that this was the calculated composition of a smelt bed for a liquor containing boron (page 48, col. 3, lines 19 to 21, and page 49, Figure 1 title), and that the process would eliminate the need for the recausticizing plant, including the lime kiln (p. 48, col. 1, lines 12-16).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund, Kohl, and Nilsson as applied to claim 1 above, and further in view of Rydholm (Pulping Processes, Sven A. Rydholm, Interscience Publishers, 1967).

With respect to claim 7, Stigsson, Backlund, Kohl, and Nilsson do not disclose expressly that the sulfur content of the cellulose spent liquor in step a) measured as elemental sulfur is lower than 2 % by weight. However, it would have been obvious to a person skilled in the art that if the cellulose spent liquor in step a) comes from a soda process, as disclosed in the specification, the sulfur content of the liquor would be very low. The sulfur content would probably be significantly lower than that of spent liquor from a kraft process, which is 3% (Rydholm, page 777, Table 11.3). Therefore, it would have been obvious that the sulfur content would likely be less than 2%.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund, Kohl and Nilsson as applied to claims 1 and 11 above, and further in view of Nilsson (U.S. Patent 5,976,321).

With respect to claim 12, Stigsson, Backlund, Kohl and Nilsson do not disclose expressly that carbon dioxide gas is liberated and removed from the aqueous solution prior to combining with the alkaline liquor of b), said liberation achieved by thermal treatment of the solution, decompression and flashing or combinations thereof to provide an alkaline solution with an alkali carbonate content lower than about 2 g/liter.

Nilsson ('321) discloses expressly that carbon dioxide gas is liberated and removed from the aqueous solution (col. 13, lines 27 to 32) prior to combining with the raw cooking liquor of b), (col. 11, lines 55 to 58) said liberation achieved by decompression and flashing to provide an alkaline solution. Although Nilsson does not disclose expressly that the alkaline solution has an alkali carbonate content lower than about 2 g/liter, the recovered solution should have a composition very close to that of the original solution of b). Again, without evidence to the contrary, the Examiner assumes that the alkali carbonate content would be zero, which is lower than the claimed about 2 g/liter.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Kinney whose telephone number is (571) 272-8388. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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